UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

March 7, 2000

MEMORANDUM

SUBJECT: Review of Registrant's Acute and Chronic Dietary Exposure and Risk Analyses for **Coumaphos**; PC code 036501; Case 818804; DP Barcode D261030; MRID No. 44956401.

FROM: Sherrie L. Mason, Chemist
Reregistration Branch II
Health Effects Division (7509C)

THROUGH: Alan Nielsen, Branch Senior Scientist
Reregistration Branch II
Health Effects Division (7509C)

and

Felecia Fort and Douglas Dotson
Dietary Exposure Science Advisory Council (DE SAC)
Health Effects Division (7509C)

TO: Christina Jarvis, Risk Assessor
Reregistration Branch II
Health Effects Division (7509C)

and

Monica Alvarez, Chemical Review Manager
Special Review Branch
Special Review and Reregistration Division [7508W]

Action Requested

Bayer Corporation has submitted a Tier 3 acute dietary exposure assessment and a chronic dietary exposure assessment for coumaphos. The analysis was conducted by Novigen Sciences, Inc. RRB2 has been asked to review this submission.

This memo has been reviewed and approved by the Health Effects Division's Dietary Exposure Science Advisory Council.

Executive Summary

The registrant's Tier 3 acute and chronic dietary exposure assessments have determined that the dietary risk estimates associated with the use of coumaphos are below the Agency's level of concern. This dietary exposure assessments used Dietary Exposure Evaluation Model (DEEM™), 1989-1992 food consumption data from the United States Department of Agriculture's (USDA's) Continuing Surveys of Food Intake by Individuals (CSFII), anticipated residues (ARs), and percent livestock treated (%LT) estimates from Bayer and a July 8, 1999 memorandum from Arthur Grube of the Special Review and Reregistration Division (SRRD). The acute dietary risk estimate for the highest exposed population, children 1-6 years of age, was calculated to be 0.5% of the acute Population Adjusted Dose (aPAD[1]). The chronic dietary risk estimate for children 1-6 years of age (highest exposed population) was 1.3% of the chronic Population Adjusted Dose (cPAD[1]).

The Agency has conducted a Tier 3 acute and chronic revised dietary exposure assessments determining that the dietary risk estimates associated with the use of coumaphos for the control of arthropod pests on cattle, horses, and swine are below the Agency's level of concern. The Agency's dietary exposure assessments used the DEEM™ and the following data: 1989-1992 food consumption data from the USDA's CSFII; 1997-1998 monitoring data from USDA's Pesticide Data Program (PDP); ARs; and %LT estimates from the Biological Economic Analysis Division (BEAD) . The acute dietary risk estimate at the 99.9th percentile for the highest exposed population, infants <1 year of age, is 22% of the aPAD and the chronic dietary risk estimate for children 1-6 years of age (highest exposed population) is 13% of the cPAD.

Bayer's dietary exposure assessments used %LT estimates that are inconsistent with the %LT estimates reported by BEAD. Bayer also did not include the use of Residue Data Files (RDFs) or milk as a commodity; therefore, the Agency does not consider Bayer's dietary exposure assessments to be acceptable at this time.

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[1] aPAD/cPAD =acute/chronic Population Adjusted Dose = Acute or Chronic RfD / FQPA Safety Factor

Toxicological Information

Bayer has completed a dietary risk assessment for coumaphos using updated methods for estimating acute dietary exposure. Table 1 of the July 9, 1999 addendum from C. Jarvis (DP Barcode: D257524) lists the hazard endpoints that Bayer has used for the dietary exposure assessment of coumaphos.

An uncertainty factor (UF) of 100 was applied by Bayer to both acute and chronic risk assessments to account for inter-species extrapolation and intra-species variability. The FQPA Safety Factor for the protection of infants and children was reduced to 1X. A cancer risk assessment was not included.

The reduction of the FQPA safety factor to 1X is considered acceptable by the Agency. On May 17, 1999, the FQPA Safety Factor Committee ruled in favor of reducing the FQPA safety factor to 1X (B. Tarplee memo, 06/01/99). Since the FQPA safety factor was reduced to 1X, the acute and chronic PADs are equivalent to their respective RfDs.

The toxicology database for coumaphos is complete, and will support reregistration. Coumaphos is a Group E chemical, indicating that it is not likely to be carcinogenic in humans via relevant routes of exposure; therefore, the Agency agrees that a cancer assessment is not necessary.

The following toxicology endpoints were used in the registrant's acute and chronic dietary risk assessments:

Table 1: Doses and Endpoints Selected for the Registrant's Acute and Chronic Dietary Risk Assessment

EXPOSURE SCENARIO	DOSE (mg/kg/day)	ENDPOINT
Acute Dietary	LOAEL= 2.0 UF = 300 (100X inter-and intraspecies extrapolation and 3X lack of NOAEL)	Plasma ChE inhibition in females and RBC ChE Inhibition in both male and female rats
	Acute RfD = 0.007 mg/kg/day aPAD = 0.007 mg/kg/day	
Chronic Dietary	NOAEL=0.025 UF = 100 (100X interspecies extrapolation and intraspecies variability)	Plasma and RBC ChE Inhibition in both male and female dogs
		Chronic RfD = 0.0003 mg/kg/day
	Chronic RfD = 0.0003 mg/kg/day cPAD = 0.0003 mg/kg/day	

ChEI = Cholinesterase Inhibition.

Consumption Data and Dietary Risk Analysis

Bayer's acute and chronic dietary exposures were estimated from food consumption data collected during the 1989-1992 CSFII. The CSFII includes two components: (1) Household food use during a seven day period and (2) individual intakes by household members. Consumption data are averaged for the entire U.S. population, and within population subgroups such as "all infants" to determine chronic risk assessment, but retained as individual daily consumption data points to determine acute risk assessment (which is based on distributions of consumption estimates for either deterministic- or probabilistic-type exposure estimates). The DEEM™ software is capable of calculating probabilistic type risk assessments when appropriate residue data (distribution of residues) are available.

This is consistent with current Agency policy.

Residue Information

The registrant's dietary exposure assessments have incorporated %LT estimates by BEAD, and ARs for beef, horse, pork, and veal. Poultry, eggs, goat, sheep, and milk as a commodity were not included in the registrant's dietary exposure assessment.

Although tolerances are still listed for poultry, eggs, goats, and sheep (CFR 40 § 180.189), the use of coumaphos on poultry and eggs has been canceled and the use of coumaphos on goats and sheep will be revoked. Therefore, poultry, eggs, goats, and sheep should not be included in the dietary exposure assessments. On the other hand, milk as a commodity has been incorporated into the Agency's dietary exposure assessment, though the PDP data show no detectable residues out of the 750 samples tested. This commodity has been included in the Agency's assessments with a residue value set at LOD for all non-detectable residues. The Agency has decided that milk should be included in the assessment due to the fact that milk is a highly consumed commodity.

Coumaphos-Oxygen Analog:

Bayer used the AR values that were calculated in the M. Metzger memorandum dated 7/18/89; however, the chronic AR for beef fat has been revised to 0.072 ppm from 0.15 ppm (C. Olinger memorandum dated 3/7/95; DP Barcode: D211656). These ARs include both the parent coumaphos and the coumaphos-oxygen analog.

Total coumaphos residues (sum of coumaphos and coumaphos oxygen analog) were used in the Agency's dietary exposure assessments. The Agency also used the ARs calculated by M. Metzger and the revised AR calculated by C. Olinger. The Agency has concluded that the use of these ARs is acceptable; however, Bayer did not include milk as a commodity. The Agency calculated the total coumaphos residues for milk by summing residues of coumaphos and coumaphos oxygen analog, using ½ LOD for non-detectable residues. Since both compounds were <LOD, the total coumaphos residue for the sample was assumed to be 1xLOD (½ LOD for each compound).

Processing Factors and %LT:

Bayer has incorporated %LT in their dietary exposure assessments. The %LT values for beef cattle (including veal), swine, and horses were obtained from Bayer. Swine and horse meat treatments comprised less than 1% of the market share and beef cattle treatments (including veal) comprised 4% of the market share. Bayer used these values as the second adjustment factor in both the chronic and acute dietary exposure assessments. DEEM™ default concentration factors for both the acute and chronic analyses were used.

The Agency agrees that refinements using %LT information should be incorporated into the dietary exposure analyses for both acute and chronic risk estimates; however, the %LT estimates used in Bayer's dietary exposure assessments are inconsistent with the %LT estimates reported by BEAD. The %LT estimates from BEAD used in the Agency's dietary exposure assessment are: 5%LT for beef cattle only (not including veal); 4%LT for dairy cattle only; and 1%LT for swine. The %LT for the remaining commodities were assumed to be 100%LT. The Agency also used DEEM™ default concentration factors for both the acute and chronic analyses.

Residue Estimates for Meat, Milk and Swine:

Bayer used the ARs calculated in the memorandum by M. Metzger dated 7/18/89 and the chronic beef fat AR calculated in the memorandum by C. Olinger dated 3/7/95.

The Agency considers the ARs used in the Bayer assessment to be acceptable with the exception of milk. Milk was not included in the Bayer dietary exposure assessments; however, all ARs should be re-evaluated in five years. For milk, the Agency used 1997 and 1998 PDP monitoring data which show no detectable residues out of 750 samples tested. All AR values were used in a RDF for the acute dietary exposure assessment.

Table 2: AR Values for Use in Calculating Acute and Chronic Exposure Estimates

Commodity	EPA's ARs (ppm)				Bayer's ARs (ppm)		
	%LT	Chronic	Acute		%LT	Chronic	Acute
Beef (and horse), lean meat without removable fat	5% beef only	0.03	RDF	95 ZEROS 5 @ 0.05	4% beef 1% horse	0.03	0.05
Beef, fat	5%	0.07	RDF	95 ZEROS 5 @ 0.40	4%	0.07	0.40
Beef, liver (and meat by-products)	5%	0.10	RDF	95 ZEROS 5 @ 0.10	4%	0.10 0.15 byp	0.10 0.15 byp
Beef, kidney	5%	0.04	RDF	95 ZEROS 5 @ 0.04	4%	0.04	0.04
Hog, lean meat	1%	0.03	RDF	99 ZEROS 1 @ 0.20	1%	0.03	0.20

Commodity	EPA's ARs (ppm)				Bayer's ARs (ppm)		
	%LT	Chronic	Acute		%LT	Chronic	Acute
Hog, fat	1%	0.06	RDF	99 ZEROS 1 @ 0.60	1%	0.06	0.60
Hog, liver (and meat by-products)	1%	0.02	RDF	99 ZEROS 1 @ 0.02	1%	0.02 0.06 byp	0.02 0.06 byp
Hog, kidney	1%	0.02	RDF	99 ZEROS 1 @ 0.02	1%	0.02	0.02
Veal, lean meat without removable fat	100%	0.03	0.05	NA	4%	0.03	0.05
Veal, fat	100%	0.07	0.40	NA	4%	0.07	0.40
Veal, liver (and meat by-products)	100%	0.10	0.10	NA	4%	0.10 0.15 byp	0.10 0.15 byp
Veal, kidney	100%	0.04	0.04	NA	4%	0.04	0.04
Milk	4%	0.00064	RDF	720ZEROS 30@0.016	Not Included	Not Included	Not Included

Note: **Residue Data File (RDF).**
byp = meat by-products
The chronic milk AR incorporates the %LT.

Results and Discussion

Bayer's dietary exposure assessments used %LT estimates that are inconsistent with the %LT estimates reported by BEAD. They also did not include the use of Residue Data Files (RDFs) or milk as a commodity; therefore, the Agency does not consider Bayer's dietary exposure assessments to be acceptable at this time. Results are presented below in tables 3 and 4.

Table 3: Acute Dietary Risk Estimates

Population	EPA's Acute Estimates (99.9th Percentile)		Bayer's Acute Estimates (99.9th Percentile)	
	Exposure mg/kg/day	% aPAD	Exposure mg/kg/day	% aPAD
U.S. Population	0.000618	9%	0.000057	0.8%
All Infants (<1 year)	**0.001559**	**22%**	0.000053	0.8%
Children 1-6 years	0.001151	16%	**0.000085**	**1.2%**
Children 7-12 years	0.000626	9%	0.000061	0.9%
Females13-50 years	0.000331	5%	0.000038	0.5%

Table 4: Chronic Dietary Risk Estimates

Population	EPA's Chronic Estimates		Bayer's Chronic Estimates	
	Exposure mg/kg/day	% cPAD	Exposure mg/kg/day	% cPAD
U.S. Population	0.000013	5%	0.000002	0.7%
All Infants (<1 year)	0.000011	4%	0.000001	0.3%
Children 1-6 years	**0.000033**	**13%**	**0.000003**	**1.3%**
Children 7-12 years	0.000022	9%	0.000002	1.0%
Females 13-50 years	0.000009	4%	0.000001	0.5%

cc: Sherrie L. Mason (RRB2), L. Richardson (CEB1), Coumaphos Reg. Std. File, Coumaphos Subject File, RF, LAN. RD/I: Dietary Exposure SAC (2/29/2000).

7509C: RRB2: S. Mason: CM#2:Rm 722B: 703-305-0563:3/7/2000.